CLAIMS

1. A magnetic resonance imaging system comprising:

means which generates a static magnetic field;

5   gradient magnetic field generating means which generates a gradient magnetic field;

RF magnetic field generating means which generates an RF magnetic field;

measuring means which measures a magnetic resonance

10   signal generated from a target;

computing means which performs a computation on the magnetic resonance signal;

memory means which stores the magnetic resonance signal and the result of computation by the computing means; and

15   sequence control means which sets operating conditions to respective portions of the gradient magnetic field generating means, the RF magnetic field generating means, the measuring means, the computing means and the memory means to control the operations of the respective portions,

20   wherein the sequence control means includes control to irradiate the target with the RF magnetic field at least once, measure the magnetic resonance signal generated after the irradiation of the RF magnetic field in a state in which the strength of application of the gradient magnetic field is

25   approximately zero, and calculate magnetic resonance spectrum

information from the measured magnetic resonance signal to thereby perform a magnetic resonance spectrum measurement, and

wherein the sequence control means performs control (1) to measure a first magnetic resonance signal generated from

5   a measurement voxel at the magnetic resonance spectrum measurement at a first time interval, (2) to detect a magnetic resonant frequency F1 of water from a first magnetic resonance spectrum obtained by Fourier-transforming the first magnetic resonance signal, (3) to measure a second magnetic resonance

10   signal generated from the voxel at a second time interval subsequent to the elapse of a predetermined time from the measurement of the first magnetic resonance signal, (4) to detect a magnetic resonant frequency F2 of water from a second magnetic resonance spectrum obtained by Fourier-transforming the second

15   magnetic resonance signal, and (5) to calculate a time-varying rate of the magnetic resonant frequency of water on the basis of the F1 and F2.

2. A magnetic resonance imaging system comprising:

20   means which generates a static magnetic field;

gradient magnetic field generating means which generates a gradient magnetic field;

RF magnetic field generating means which generates an RF magnetic field;

25   measuring means which measures a magnetic resonance

signal generated from a target;

computing means which performs a computation on the magnetic resonance signal;

memory means which stores the magnetic resonance signal

5   and the result of computation by the computing means; and

sequence control means which sets operating conditions to respective portions of the gradient magnetic field generating means, the RF magnetic field generating means, the measuring means, the computing means and the memory means to control the

10   operations of the respective portions,

wherein the sequence control means includes control to irradiate the target with the RF magnetic field at least once, measure the magnetic resonance signal generated after the irradiation of the RF magnetic field in a state in which the

15   strength of application of the gradient magnetic field is approximately zero, and calculate magnetic resonance spectrum information from the measured magnetic resonance signal to thereby perform a magnetic resonance spectrum measurement, and

wherein the sequence control means performs control (1)

20   to measure a first magnetic resonance signal generated from a measurement voxel at the magnetic resonance spectrum measurement at a first time interval, (2) to detect a magnetic resonant frequency F1 of water from a first magnetic resonance spectrum obtained by Fourier-transforming the first magnetic

25   resonance signal, (3) to measure a second magnetic resonance

signal generated from the voxel at a second time interval subsequent to the elapse of a predetermined time from the measurement of the first magnetic resonance signal, (4) to detect a magnetic resonant frequency F2 of water from a second magnetic

5   resonance spectrum obtained by Fourier-transforming the second magnetic resonance signal, (5) to estimate, based on the F1 and F2, a time-varying rate of a magnetic resonant frequency of water at a measurement time at which the magnetic resonance signal is measured after the completion of measurement of the

10   second magnetic resonance signal, (6) to calculate, using the estimated time-varying rate of the magnetic resonant frequency, a transmission frequency of the RF magnetic field or/and a received frequency at which the magnetic resonance signal generated from the voxel is received and measure the magnetic

15   resonance signal generated from the voxel after the setting of the operating conditions of the RF magnetic field generating means or/and the measuring means, and (7) to perform said (6) repeatedly plural times subsequently to the completion of measurement of the second magnetic resonance signal.

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3. A magnetic resonance imaging system comprising:
means which generates a static magnetic field;
gradient magnetic field generating means which generates
a gradient magnetic field;

25   RF magnetic field generating means which generates an

RF magnetic field;

measuring means which measures a magnetic resonance signal generated from a target;

computing means which performs a computation on the

5 magnetic resonance signal;

memory means which stores the magnetic resonance signal and the result of computation by the computing means; and

sequence control means which sets operating conditions to respective portions of the gradient magnetic field generating

10 means, the RF magnetic field generating means, the measuring means, the computing means and the memory means to control the operations of the respective portions,

wherein the sequence control means includes control to irradiate the target with the RF magnetic field at least once,

15 measure the magnetic resonance signal generated after the irradiation of the RF magnetic field in a state in which the strength of application of the gradient magnetic field is approximately zero, and calculate magnetic resonance spectrum information from the measured magnetic resonance signal to

20 thereby perform a magnetic resonance spectrum measurement, and

wherein the sequence control means performs, when the measurement of the magnetic resonance signal is performed repeatedly plural times, control (1) to execute a pre-scan for measuring a magnetic resonant frequency of water each time the

25 magnetic resonance signal is measured a predetermined number

of times, (2) to detect a magnetic resonant frequency of water from a magnetic resonance spectrum obtained by Fourier-transforming the magnetic resonance signal obtained by the pre-scan, and (3) to set, based on the magnetic resonant

5   frequency detected in said (2), a transmission frequency of the RF magnetic field radiated into the target or/and a received frequency at the measurement of the magnetic resonance signal in the spectrum measurement sequence executed subsequently to the pre-scan.

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4. A magnetic resonance imaging system comprising:

means which generates a static magnetic field;

gradient magnetic field generating means which generates a gradient magnetic field;

15   RF magnetic field generating means which generates an RF magnetic field;

measuring means which measures a magnetic resonance signal generated from a target;

computing means which performs a computation on the

20   magnetic resonance signal;

memory means which stores the magnetic resonance signal and the result of computation by the computing means; and

sequence control means which sets operating conditions to respective portions of the gradient magnetic field generating

25   means, the RF magnetic field generating means, the measuring

means, the computing means and the memory means to control the operations of the respective portions,

wherein the sequence control means performs, when the measurement of the magnetic resonance signal is performed repeatedly plural times, control (1) to execute a pre-scan for measuring a magnetic resonant frequency of water each time the magnetic resonance signal is measured a predetermined number of times, (2) to detect a magnetic resonant frequency of water from a magnetic resonance spectrum obtained by Fourier-transforming the magnetic resonance signal obtained by the pre-scan, and (3) to set, based on the magnetic resonant frequency of water detected in said (2), a transmission frequency of the RF magnetic field radiated into the target or/and a received frequency at the measurement of the magnetic resonance signal in a pulse sequence executed subsequently to the pre-scan.

5. A magnetic resonance imaging system comprising:

means which generates a static magnetic field;

gradient magnetic field generating means which generates a gradient magnetic field;

RF magnetic field generating means which generates an RF magnetic field;

measuring means which measures a magnetic resonance signal generated from a target;

computing means which performs a computation on the

magnetic resonance signal;

memory means which stores the magnetic resonance signal and the result of computation by the computing means; and

sequence control means which sets operating conditions

5   to respective portions of the gradient magnetic field generating means, the RF magnetic field generating means, the measuring means, the computing means and the memory means to control the operations of the respective portions,

wherein the sequence control means performs control (1)

10   to execute a water suppression sequence for applying the RF magnetic field and the gradient magnetic field to the target to thereby suppress a signal of water, (2) to execute a spectrum measurement sequence for applying the RF magnetic field and the gradient magnetic field to the target to select and excite

15   a predetermined voxel and measuring the magnetic resonance signal generated from the predetermined voxel, (3) to execute a pre-scan sequence for measuring a magnetic resonant frequency of water prior to said (1) and (2) being executed a predetermined number of times, where said (1) and (2) are performed repeatedly

20   plural times, and (4) to, on the basis of the magnetic resonant frequency of water detected in said (3), set a transmission frequency of the RF magnetic field irradiated in the water suppression sequence and set a transmission frequency of the RF magnetic field irradiated to select and excite the

25   predetermined voxel or/and a received frequency at the detection

of the magnetic resonance signal generated from the

predetermined voxel in the spectrum measurement sequence.

　　　　6. A magnetic resonance imaging system comprising:

5　　　　means which generates a static magnetic field;

　　　　gradient magnetic field generating means which generates

a gradient magnetic field;

　　　　RF magnetic field generating means which generates an

RF magnetic field;

10　　　　measuring means which measures a magnetic resonance

signal generated from a target;

　　　　computing means which performs a computation on the

magnetic resonance signal;

　　　　memory means which stores the magnetic resonance signal

15　and the result of computation by the computing means; and

　　　　sequence control means which sets operating conditions

to respective portions of the gradient magnetic field generating

means, the RF magnetic field generating means, the measuring

means, the computing means and the memory means to control the

20　operations of the respective portions,

　　　　wherein the sequence control means performs control (1)

to execute a water suppression sequence for applying the RF

magnetic field and the gradient magnetic field to the target

to thereby suppress a signal of water, (2) to execute a spectrum

25　measurement sequence for applying the RF magnetic field and

the gradient magnetic field to the target to select and excite

a predetermined voxel and measuring the magnetic resonance

signal generated from the predetermined voxel, (3) to, when

said (1) and (2) are performed repeatedly plural times, detect

5   a water signal peak from a magnetic resonance spectrum obtained

by Fourier-transforming the magnetic resonance signal obtained

by the execution of said (1) and (2), each time said (1) and

(2) are executed a predetermined number of times to calculate

a signal strength of the water signal peak, (4) to determine

10   that a magnetic resonant frequency of water has been shifted

when the calculated signal strength of the water signal peak

is increased to a predetermined value or more, (5) to execute

a pre-scan for measuring the water magnetic resonant frequency

when the water magnetic resonant frequency is judged to have

15   been shifted in said (4), (6) to detect a magnetic resonant

frequency of water from a magnetic resonance spectrum obtained

by Fourier-transforming the magnetic resonance signal obtained

in the pre-scan, and (7) to, in a pulse sequence executed

subsequently to the pre-scan on the basis of the magnetic

20   resonant frequency of water detected in said (6), set a

transmission frequency of the RF magnetic field irradiated in

the water suppression sequence, or/and set a transmission

frequency of the RF magnetic field irradiated to select and

excite the predetermined voxel in the spectrum measurement

25   sequence, or/and set a received frequency at the detection of

the magnetic resonance signal generated from the predetermined

voxel.

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